

CLAIMS

What is claimed is:

1. A vertical cavity surface emitting laser module configured to operate within a temperature range, the module comprising:

a vertical cavity surface emitting laser that has an optimal operating temperature, wherein the vertical cavity surface emitting laser is tuned such the optimal operating temperature is higher than a room temperature;

a temperature sensor; and

a heater configured to turn on when the temperature sensor senses a temperature measurement that is below a predetermined value, wherein the predetermined value is determined in relation to the optimal operating temperature of the vertical cavity surface emitting laser.

2. A module as defined in claim 1, wherein the optimal operating temperature is configured by adjusting a thickness of an active layer included in the vertical cavity surface emitting laser.

3. A module as defined in claim 1, wherein the optimal operating temperature is configured by adjusting a composition of an active layer included in the vertical cavity surface emitting laser.

4. A module as defined in claim 1, wherein the optimal operating temperature is configured by adjusting an ambient temperature to substantially match the optimal operating temperature.

5. A module as defined in claim 1, wherein at the optimal operating temperature, a cavity resonance point of the vertical cavity surface emitting laser is substantially aligned with a gain bandwidth peak.

6. A module as defined in claim 1, wherein the temperature sensor is a thermistor.

7. A module as defined in claim 1, wherein the heater is a resistor.

8. A vertical cavity surface emitting laser module configured to operate within a temperature range that is higher than a conventional vertical cavity surface emitting laser tuned to operate at room temperature, the module comprising:

a vertical cavity surface emitting laser (VCSEL) having an active region, wherein a thickness and a composition of the VCSEL are configured such that an optimal operating temperature of the VCSEL is higher than about room temperature;

a temperature sensor that senses an operating temperature of the VCSEL;

and

a control module that prevents the operating temperature of the VCSEL from falling below a threshold temperature using a heater to raise the operating temperature to the optimal operating temperature.

9. A module as defined in claim 8, wherein the temperature sensor is a thermistor.

10. A module as defined in claim 8, wherein a cavity resonance of the VCSEL is chosen such that the cavity resonance substantially aligns with a gain bandwidth peak when the operating temperature substantially matches the optimal operating temperature.

11. A module as defined in claim 8, wherein the optimal operating temperature is greater than room temperature.

12. A module as defined in claim 8, wherein the optimal operating temperature is greater than 50 degrees Celsius.

13. A module as defined in claim 8, wherein the optimal operating temperature is 70 degrees Celsius.

14. A module as defined in claim 8, wherein the threshold temperature is determined in relation to the optimal operating temperature.

15. A module as defined in claim 8, wherein the threshold temperature is determined in relation to room temperature.

16. A module as defined in claim 8, wherein the control module turns the heater off when the operating temperature exceeds the optimal operating temperature.

17. A vertical cavity surface emitting laser module configured to operate within a temperature range that is wider than a conventional vertical cavity surface emitting laser tuned to operate at room temperature, the module comprising:

a vertical cavity surface emitting laser (VCSEL) having an active region with a thickness and a composition that are chosen such that a cavity resonance substantially aligns with a gain bandwidth peak at an optimal operating temperature that is higher than 30 degrees Celsius;

a temperature sensor that senses an operating temperature of the VCSEL;

a heating element; and

a control module that turns the heating element on and off based on a value of the operating temperature received from the temperature sensor, wherein the control module turns the heating element on when the operating temperature reaches a threshold temperature that is below the optimal operating temperature and wherein the control module turns the heating element off when the operating temperature is close to or exceeds the optimal operating temperature.

18. A module as defined in claim 17, wherein the optimal operating temperature is higher than 50 degrees Celsius and below 90 degrees Celsius.

19. A module as defined in claim 18, wherein the optimal operating temperature is about 70 degrees Celsius.

20. A module as defined in claim 17, wherein the heating element is in contact with a portion of the VCSEL.

21. A module as defined in claim 17, wherein the heating element is in an enclosed area with the VCSEL.

22. A module as defined in claim 17, wherein the heating element is a resistor.

23. A module as defined in claim 17, wherein the temperature sensor is a thermistor.